International Journal of Medicine
and Pharmaceutical Science (IJMPS)
ISSN (P): 2250-0049; ISSN (E): 2321-0095
Vol. 11, Issue 2, Dec 2021, 71–80

TRANS STELLAR
•Journal Publications •Research Consultancy

Original Article

EFFECTIVENESS OF PREOPERATIVE INTRAVENOUS DEXAMETHASONE ON POSTOPERATIVE PAIN DURING GYNAECOLOGICAL SURGERIES UNDER SPINAL ANAESTHESIA WITH BUPIVACAINE PLUS FENTANYL IN TERTIARY CARE HOSPITAL– A PROSPECTIVE DOUBLE BLIND STUDY

DR SUREKHA S CHAVAN[1] , DR MADHU A CHAVAN[2] , DR STEPHAN JEBARAJ[3] & DR PRIYA CHAVRE[4]

[1]*Associate Professor, Department of Anaesthesiology, BJ Govt Medical College and Sassoon General Hospitals, Pune India*

[2]*Senior Resident, Department of Anaesthesiology, BJ Govt Medical College and Sassoon General Hospitals, Pune India*

[3]*Assistant Professor, Department of Anaesthesiology, BJ Govt Medical College and Sassoon General Hospitals, Pune India*

[4]*Junior Resident, Department of Anaesthesiology, BJ Govt Medical College and Sassoon General Hospitals, Pune India*

ABSTRACT

Introduction: Acute pain; a key component for enhanced postoperative recovery; is modifiable risk factor contributing development of chronic post-operative pain. Spinal anaesthesia is common technique for lower abdominal gynaecological surgeries. Opioids added to intrathecal Bupivacaine for prolonging duration of analgesia, have inherent adverse effects. Analgesic, antiemetic and anti-inflammatory benefits of Dexamethasone have been demonstrated during various surgeries. Aim: to evaluate effect of preoperative intravenous Dexamethasone in patients undergoing gynaecological surgeries under spinal anaesthesia with Bupivacaine plus Fentanyl. Primary Objective- to evaluate effectiveness on post-operative pain. Secondary Objective- to evaluate effect on postoperative nausea/vomiting. Methods: Ethics Committee approval was taken. Total 100 female patients, (age>18years, ASA grade-I/II) posted for elective gynaecological surgeries under spinal anaesthesia, randomly divided into two groups of 50 each. Group-A (intravenous dexamethasone 0.1mg/kg); Group-B (intravenous 0.9% normal saline 2ml). Results- Demographic data, hemodynamic parameters and Modified Bromage Scores were comparable (P> 0.05). Dexamethasone effectively reduced post-operative pain. VAS Scores were significantly lower in study group compared to control group (p< 0.01) at 2 hours, 6 hours and 24 hours. Dexamethasone was effective in significant reduction of post-operative rescue analgesic dose and post-operative nausea and vomiting (P<0.05). Conclusion- Preoperative intravenous Dexamethasone (0.1mg/kg) is effective and safe for postoperative analgesia during gynaecological surgeries under spinal anaesthesia with Bupivacaine plus Fentanyl.

KEYWORDS: gynaecological surgery, intravenous dexamethasone, postoperative pain, spinal anaesthesia

Received: Jun 27, 2021; **Accepted**: Jul 17, 2021; **Published**: Sep 29, 2021; **Paper Id.**: IJMPSDEC202110

INTRODUCTION

Spinal anaesthesia is preferred technique for lower abdominal gynaecological surgeries. Various intrathecal opioids are added to Bupivacaine for prolonging the duration of analgesia. However, risks of delayed respiratory depression, nausea, vomiting, pruritus and urinary retention are inherent adverse effects of intrathecal opioids (1). Analgesia and adverse effects of opioids are dose-dependent; hence technique that potentiates analgesic effects is of more importance.

During gynaecological surgeries 4.7-26.2% females experience chronic post-operative pain (2). Acute pain is modifiable risk factor, responsible for development of chronic post-operative pain and important for enhanced recovery after surgery (3). Suboptimal control of acute pain during surgery is accompanied by consequences-high morbidity, diminished physical functions/quality of life, increased Opioid use & hospital stay/cost. Predicted risk factors for moderate-severe acute postoperative pain include younger age , female gender, type and duration of surgery, preoperative pain/anxiety. Despite an increased emphasis on postoperative pain control, many recent studies have shown that 30-77% patients experience moderate-to-severe pain postoperatively (4). The analgesic and anti-inflammatory benefits of Dexamethasone have been clearly demonstrated in various surgeries (4-6, 12-18). Studies suggest that minimally effective dose for preventing postoperative pain (7) and preventing nausea/vomiting is to be at least 8 mg in adults. (8,9)

We started with basic research question 'whether preoperative intravenous Dexamethasone is efficacious or not for control of post-operative pain during gynaecological surgeries under spinal anaesthesia with Bupivacaine plus Fentanyl'.

AIM

To evaluate the effect of preoperative intravenous Dexamethasone in patients undergoing gynaecological surgeries under spinal anaesthesia with Bupivacaine plus Fentanyl. Pr**imary objective** of study was to evaluate the effectiveness on post-operative pain. S**econdary objective** was to evaluate the effect on post-operative nausea and vomiting (PONV)

METHODOLOGY

Study Design & Study Setting: This was prospective double blind study, done in tertiary care hospital, during January 2018 to July 2019. The study was approved by Institutional Ethics Committee. **Inclusion criteria:** Female patients of age >18years and American Society of Anaesthesiologists (ASA) grade I/II, undergoing elective gynaecological surgeries under spinal anaesthesia of 2 hours duration. **Exclusion criteria:** history of allergy/hypersensitivity to dexamethasone/bupivacaine/fentanyl, patients on antidepressants, sedatives/opioids, major systemic/neuropsychiatric illness & any contraindication to spinal anaesthesia technique.

Sample Size Estimation -Sample size was calculated by comparing with previous studies for attaining P value of statistical significance (10-13). Calculations done by computerized software winpepi (Version 11.65 copyright J.H.Abramson Aug.23, 2016). Shalu et al in 2017 in their study 'Efficacy of Intravenous Dexamethasone in Prolonging the duration of Spinal anaesthesia in elective caesarean section', recruited 60 cases divided equally into Dexamethasone and control group (12). In a comparative randomized control trial of Dexamethasone with placebo in lower segment caesarean section for control of PONV, Jaafarpour et al in 2008, selected 80 cases divided in 2 groups (13). **Required Sample:** Continuity-corrected sample size: Total 100. Expected Precision- approx. 95% CI for difference between proportions, we considered sample size of 100, and divided into two groups- Group-A (Study Group) receiving intravenous dexamethasone (0.1mg/kg) & Group-B (Control Group) receiving intravenous 2ml normal saline(0.9%), 30 minutes before giving spinal anaesthesia.

Randomisation-Block randomisation was used to randomly allocate the treatment groups to patient population. Size of each block was maintained at 10. Total 10 blocks were randomised using computer program. Each block was assigned for cases recruited every 4 to 6 weeks. **Blinding-** The drug/placebo solution was drawn into a syringe by a nurse not participating in study and was delivered to the investigator unaware of the content. The dexamethasone and saline

solution appeared transparent and completely identical at the time syringes were given to investigator. Thus, neither the participant nor the investigators responsible for collecting data and assessing the outcomes were aware of the intervention assignments. The study drug was administered to patient within 5 minutes after being drawn into syringes.

Statistical Analysis- Student's t test was used to compare continuous variables and Chi-Square test to assess differences in proportions and to measure the linear trend as appropriate. We deemed p value < 0·05 to be significant. We used Microsoft Excel 2016 for data compilation and SAS version 20.0 for all statistical analyses.

Anaesthetic Technique: Selected female patients scheduled for elective gynaecological surgeries under spinal anaesthesia were screened for preoperative assessment and necessary investigations. Patients were kept nil by mouth for 6 hours preoperative. Intravenous cannula-18G was secured and preloading with Ringer lactate (10ml/kg) was started. Monitors (Electrocardiogram, Noninvasive blood pressure, Pulseoxymeter) were attached. All patients received intravenous premedication: inj.Ondansetron 0.08mg/kg, inj.Ranitidine 1mg/kg. Group-A (Study Group) received intravenous dexamethasone (0.1mg/kg) 30 minutes before giving spinal anaesthesia. Group-B (Control Group) received intravenous 2ml normal saline(0.9%), 30 minutes before giving spinal anaesthesia.

Subarachnoid block was given with Bupivacaine (0.5%, 15mg) & Fentanyl 25µg at L3-L4 or L4-L5 space using 25G Quincke's needle and block action set at T6 level. All patients were supplemented oxygen (4L/min) via ventimask. Level of sensory blockade was assessed with pin prick method performed in midclavicular line. Motor blockade was checked by Modified Bromage scale (14). The onset, duration, highest level of sensory block and time of regression to L1 dermatome was noted. Any adverse episode of hypotension, bradycardia, nausea, vomiting, shivering, sedation, skin rash, dry mouth and pruritus was recorded. Duration of surgery was recorded. Duration of analgesia was recorded as time from intrathecal injection to the time of complaint of pain or visual analogue scale (VAS) more than 4, whichever is earlier. Pain was assessed with help of VAS score (1 to 10, ZERO –no pain at all, TEN-worst pain). Rescue analgesia was given by IV tramadol 1mg/kg if necessary. The time of rescue analgesia and total analgesic doses in first 24hrs were recorded. Rescue antiemetic intravenous Ondansetron 0.08mg/kg was given if needed. Haemodynamic parameters- Pulse Rate, Blood Pressure were recorded– at baseline, every 5min after giving spinal anaesthesia for first 30min, at every 15min intraoperatively & every 1hour postoperatively for 24hours,

RESULTS

Table 1: Demographic Data

Variables	Group A	Group B	P value
Age (years) (Mean± SD)	42.32±8.17	41.94±7.99	0.7205
ASA Grade I/II	8/42	5/45	0.375
Total no. of Patients n(%) (BMI <18.5kg/m$^{2)}$	4 (8%)	5 (10%)	0.648
Total no. of Patients n(%) (BMI 18.5-24.9 kg/m^2)	46 (92%)	45 (90%)	0.842

BMI- body mass index, S.D.- standard deviation, The differences in demographic variables were statistically not significant (P Value >0.05)

Table 2: Distribution of Surgical Procedures

Gynaecological Surgery	Study Group Frequency (%)	Control Group Frequency (%)	Total Cases (n)	P value
Abdominal Hysterectomy	15 (30%)	17 (34%)	**32**	**0.667**
Vaginal Hysterectomy	18 (36%)	13 (26%)	**31**	**0.282**
Myomectomy	4 (8%)	5 (10%)	9	**0.728**
Salphingo-oopherectomy	2 (4%)	3 (6%)	5	**0.648**
Diagnostic Hysteroscopy	2 (4%)	1 (2%)	3	**0.559**
Hysteroscopic & CuT removal	3 (6%)	4 (8%)	7	**0.697**
Unilateral oophorectomy	2 (4%)	3 (6%)	5	**0.648**
LEEP Biopsy & Examination	3 (6%)	3 (6%)	6	**1.000**
Modified Fothergill's repair	1 (2%)	1 (2%)	2	**1.000**

The proportion of procedures didn't differed statistically between two groups **(P >0.05).**

Table 3: Modified Bromage Score

Modified Bromage Score	Group A (Mean+ SD)	Group B (Mean+ SD)	P value
Baseline (before induction)	6 ± 0	6 ± 0	**1**
At induction	2.44 ± 0.7	2.4 ± 0.75	**0.779**
During Surgery	1.06 ± 0.24	1.1 ± 0.36	**0.575**
After Surgery	1.8 ± 0.87	0.86 ± 0.96	**0.744**

There was no significant difference between two groups (P >0.05)

Table 4: Comparison of Visual Analogue Scores (VAS)

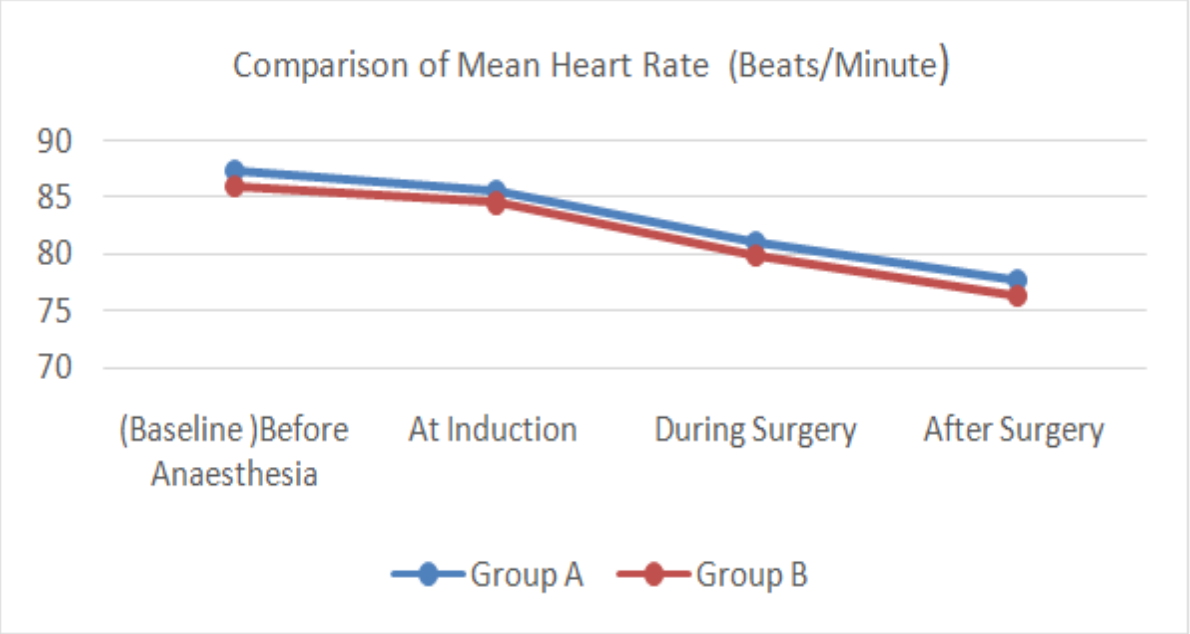
Visual Analogue Score	Group A Mean ± SD	Group B Mean ± SD	P Value	Statistical Significance
2 Hours after surgery	2.64 ± 0.93	3.88 ± 0.84	< 0.0001	**HS**
6 Hours after surgery	4.96 ± 1.15	5.62 ± 0.77	0.0011	**HS**
12 Hours after surgery	5.40 ± 1.28	5.70 ± 0.64	0.1415	NS
24 Hours after surgery	3.80 ± 1.61	4.96 ±1.08	0.0001	**HS**

SD: standard deviation, HS: highly significant, NS: not significant

Table 5: Total dose of Rescue Analgesic & Rescue Antiemetic in 24 hours Post-surgery

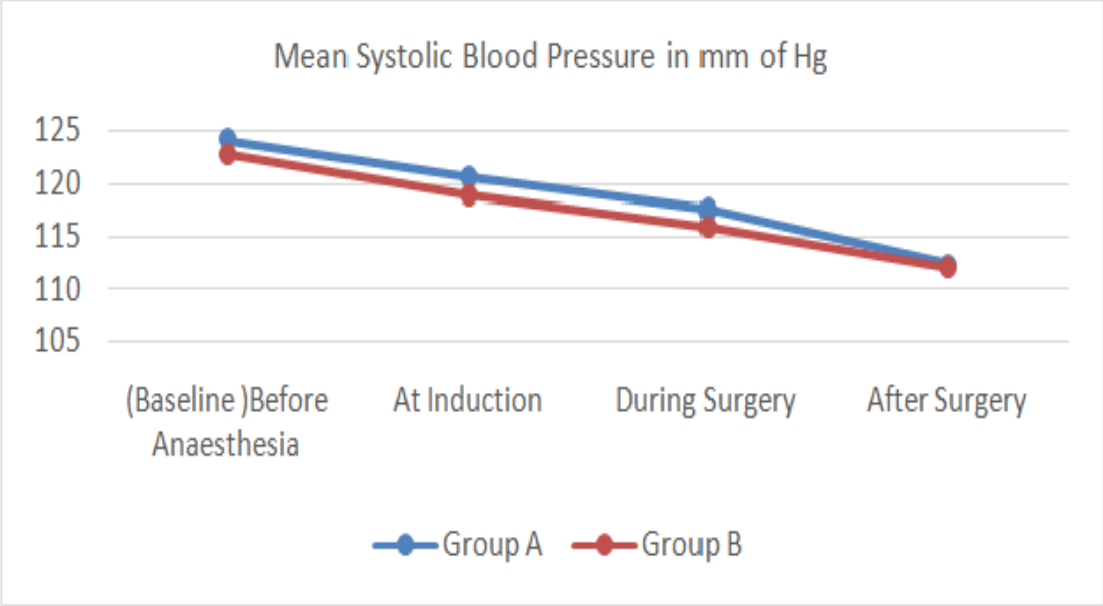
Variable	Group A Mean ± SD	Group B Mean ± SD	P Value	Statistical Significance
Total dose of Rescue Analgesic-**Tramadol** (mg)	172.69 ± 33.20	189.09 ± 36.38	<0.0001	Highly Significant
Total dose of Rescue Antiemetic **Ondansetron**(mg)	4.50 ± 0.50	8.6 ± 2.3	0.04	Significant
Total no. of cases receiving rescue antiemetic	2	7		

SD: standard deviation



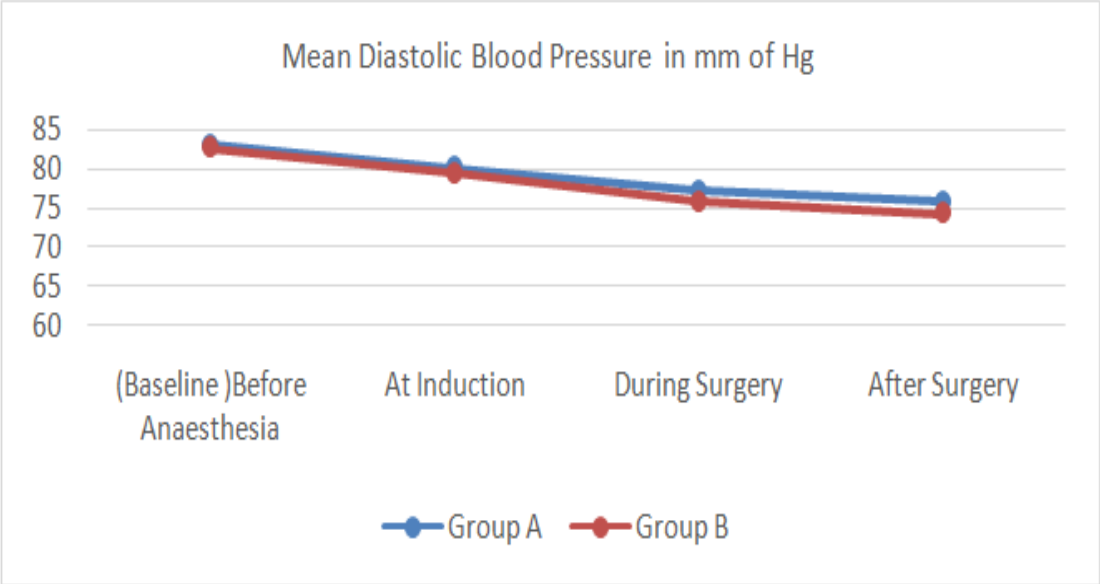
Graph 1: Comparison of Heart Rate (beats /min)

The difference between mean heart rate at baseline, at induction, during surgery and immediately after surgery was not statistically significant between two groups. (P value 0.238, 0.41, 0.37, 0.807 respectively)



Graph 2: Comparison of Systolic Blood Pressure (mmHg)

The difference between mean systolic blood pressure at baseline, at induction, during surgery and immediately after surgery was not statistically significant between two groups. (P value 0.49, 0.279, 0.298, 0.858 respectively)



Graph 3: Comparison of Diastolic Blood Pressure

The difference between mean diastolic blood pressure at baseline, at induction, during surgery and immediately after surgery was not statistically significant between groups. (P value 0.807, 0.608, 0.258, 0.169 respectively)

Table 6: Comparison of Postoperative Adverse Effects

Adverse Effect	Group A n (%)	Group B n (%)	Total Episodes	P value	Statistical significance
PONV	2 (4%)	8 (16%)	10	**0.046**	**Significant**
Hypotension	0 (0%)	2 (4%)	2	**0.131**	Not significant
Bradycardia	0 (0%)	2 (4%)	2	**0.131**	Not significant

Occurence of PONV was higher in Group B (16%), was statistically significant (P< 0.05).

DISCUSSION

Anti-inflammatory effects of dexamethas one are complex and 30 times potent than cortisol. It occurs mainly through inhibition of inflammatory cells and suppression of expression of inflammatory mediators. Antiemetic action of dexamethasone is suggested to be by action on the glucocorticoid receptor–rich bilateral Nucleus Tractus Solitarius (vomiting centre). This study was undertaken to evaluate, effect of preoperative intravenous Dexamethasone 0.1mg/kg given 30 minutes prior to spinal anaesthesia on post-operative pain in patients undergoing gynaecological surgeries under spinal anaesthesia with Bupivacaine (0.5%,15mg) plus Fentanyl(25µg). Group A (Study Group) received intravenous Dexamethasone 0.1mg/kg, 30 minutes before giving spinal anaesthesia. Group B (Control Group) received intravenous 2ml Normal Saline 0.9%, 30 minutes before giving spinal anaesthesia.

Oliveira et.al in 2011 (15), conducted comparative study on the basis of dose of dexamethasone by dividing into three groups, low dose (0.1mg/kg), intermediate dose (0.1–0.2 mg/kg), and high dose (>0.2 mg/kg). They reported dexamethasone at 0.1 mg/kg is an effective adjuvant in multimodal strategies to reduce postoperative pain and opioid consumption. In our study we used intravenous dexamethasone 0.1mg/kg, 30 minutes before giving spinal anaesthesia and found it to be efficient in achieving post-operative analgesia.

Demographic Data Analysis- Both groups were comparable and there was no statistically significant difference with respect to mean age, weight & ASA grade (Table-1). In this prospective study, approximately matching cases were chosen in control group in order to maintain parity in the groups. The mean age of patients in dexamethasone group and control group were comparable, 42.32 ± 8.17 years and 41.94 ± 7.99 years respectively (Table-1). Maximum numbers of patients in both groups were falling in postmenopausal age of 41-50 years and both groups represented comparable cohorts of the patients who underwent various types of gynaecological surgeries (Table-2). In our study, majority of the procedures conducted were abdominal (32%) or vaginal hysterectomies (31%) of overall cases. **Kang et al. in 1999**, did a similar design study of effective Dose of Dexamethasone for Antiemesis after Major Gynaecological Surgery the patients divided under different groups were in the range of 46-53 years of age.(16).

Comparison of Modified Bromage scores- To assess motor blockade, Modified Bromage score was used in our study (14). There was no statistical difference in mean Modified Bromage scores and was comparable in both the groups (Table-3). Hemodynamic parameters- There was no statistical significant difference in HR, SBP, DBP in both the groups throughout the study (Graph-1,2 & 3).

Comparison of Visual Analog Scores- In our study, at 6 hours post-surgery mean VAS was 4.96 for Group A and 5.62 for Group B. The difference had high statistical significance (p =0.0011). The difference in mean VAS score was also significantly lower at 2 hrs and 24 hrs in Dexamethasone group & was statistically significant (Table-4). Szucs et al in 2016 reported that pain scores assessed at 12 h, 24 h, 48 h, 72 h and 1 week postoperatively at rest and on passive movements did not differ between the groups but Pain scores at rest 6 hrs after surgery (the principal outcome) were lesser in the dexamethasone group compared with the placebo group [0.8(1.3) vs. 3.9(2.9), mean (SD) p = 0.0004] (17).

Total dose of rescue analgesics (IV Tramadol 1mg/kg) required over 24 hours was compared. All cases in both groups were given analgesics post-surgery. However, the number of doses given varied based upon the requirements expressed by patient and correlating them with VAS scores noted at 6^{th}, 12^{th} and 24^{th} hour (Table-4, 5). Shalu and Ghodki in 2017 observed a time to first analgesic request that was nearly twice as long in the control group (8.67 vs. 4.4 hr) (12). In our study we recorded that the total dose of Rescue Analgesic (Intravenous Tramadol) given in 24 Hrs in Group A (Dexamethasone) was significantly lesser (172.9 mg) than Group (189.09 mg) ($p<0.0001$). Since there was no significant difference in the BMIs ranges of two groups, it is highly unlikely that the doses might have varied because of difference in weights of the patients in control group. M. Heesen et al in their recent meta-analysis in 2019 showed that intravenous dexamethasone improves postoperative analgesia after spinal anaesthesia. They analysed 17 trials with a low risk of bias and found a statistically significant reduction in the postoperative consumption of intravenous morphine equivalents of 4.01 mg after intravenous dexamethasone. Postoperative analgesia was prolonged by dexamethasone, as shown by delay in request for analgesia; the analysis yielded a mean difference of 86 min, which is of clinical relevance (18).

Adverse effects- occurance of PONV was higher in control group (16%) compared to Dexamethasone group (4%), this was statistically significant ($P< 0.046$). Kadur et al in 2015 concluded that intravenous dexamethasone (0.1mg/kg) given just before subarachnoid block is an effective mode of enhancing post-operative analgesia and also reduces incidence of PONV (19). Cardoso et al in 2013 reported that vomiting occurred in 12/35 (34.4%) patients receiving dexamethasone and in 29/35 (82.9%) receiving placebo ($P<0.001$).Incidence of PONV was significantly lower ($p<0.05$) in dexamethasone group (20). The rate of PONV in our study was also similar to the study by Kang L et al (21) and those cases reporting PONV were given rescue antiemetic Ondansetron (0.08mg/kg intravenously). In our study,

incidence of PONV in both groups was very less compared to their studies. Also in our study, mean doses of Ondansetron required for management of PONV were significantly higher in control group (8.6 mg) compared to dexamethasone group (4.5 mg).

CONCLUSIONS

This study demonstrated that, administration of preoperative intravenous dexamethasone (0.1mg/kg) 30 minutes before giving spinal anaesthesia, improves analgesic and antiemetic control after major gynaecological surgery performed under spinal anaesthesia with Bupivacaine plus Fentanyl. And there were no major adverse effects observed. Hence, it can be concluded that preoperative intravenous dexamethasone (0.1mg/kg) is effective and safe for postoperative pain in patients undergoing gynaecological surgeries under spinal anaesthesia with bupivacaine plus fentanyl.

LIMITATIONS AND FUTURE SCOPE OF STUDY

There are certain limitations to our study. We conducted this study only in female patients, ASA grade 1 & 2 and gynaecological surgeries only. The cohort was mixed and therefore surgical complexities and durations also varied. Therefore, to conclude the beneficial effects of Dexamethasone, further studies should also be done in male patients, higher ASA groups and different surgical specialities (Urosurgeries, ENT or orthopaedic surgeries etc). Moreover, we followed up the patients only till 24 hours for pain management. The minimum therapeutic dose of IV dexamethasone capable of prolonging the duration of analgesia has not been evaluated. Hence, it is possible that dose used may have been more than the required.

REFERENCES

1. *Samona J, Cook C, Krupa K, et al. Effect of intra-operative dexamethasone on pain scores and narcotic consumption in undergoing total knee arthroplasty. Orthop Surg. 2017; 9:110-114.*
2. *Brandsborg B, Nikolajesn L, Hansen CT, ET al. Risk factors for chronic pain after hysterectomy: a nationwide questionnaire and database study Anaesthesiology 2007; 106:1003-1012.*
3. *Radresa O, Chauny JM, Lavegne G, et al. Current views on acute to chronic pain transition in post-traumatic patients: risk factors and potential for pre-emptive treatments. J Trauma Care Surg 2014;76:!142-1150.*
4. *Salerno A, Hermann R. Current concepts review: efficacy and safety of steroid Use for postoperative pain relief. JBJS 2006; 88(6):1361.*
5. *Kardash K, Sarrazin F, Tessler M, et al. Single-dose dexamethasone reduces dynamic pain after total Hip arthroplasty. AnesthAnalg 2008; 106(4):1253.*
6. *Sanchez Rodriguez PE, Fuentes-Orozco C, Gonzalez-Ojeda A. Effect of dexamethasone on postoperative symptoms in patients undergoing elective laparoscopic cholecystectomy: randomized clinical trial. World J Surg 2010;34:895*
7. *Fujii Y, Nakayam M. Effects of dexamethasone in preventing postoperative emetic symptoms after total knee replacement surgery: a prospective, randomized, double-blind, vehicle-controlled trial in adult Japanese patients. Clin Ther2005; 27(6):740.*
8. *Jakobsson J. Preoperative single-dose intravenous dexamethasone during ambulatory surgery: update around the benefit versus risk. CurrOpinAnesthesiol2010; 23:682.*
9. *Gan TJ, Poorly controlled postoperative pain: prevalence, consequences, and prevention, Dovepress 2017 :10, 2287—2298*

10. *Mathiesen O, Jacobsen LS, Holm HE, et al. Pregabalin and dexamethasone for postoperative pain control: a randomized controlled study in hip arthroplasty. British Journal of Anaesthesia 2008; 101: 535–41*

11. *Khatiwada S, Bhattarai B, Biswas BK, et al. Postoperative nausea and vomiting in patients undergoing total abdominal hysterectomy under subarachnoid block: a randomized study of dexamethasone prophylaxis. Kathmandu University Medical Journal 2012; 10: 41–5.*

12. *Shalu PS, Ghodki PS. To study the efficacy of intravenous dexamethasone in prolonging the duration of spinal anaesthesia in elective caesarean section. Anaesthesia Essays and Researches 2017; 11: 321–5*

13. *Jaafarpour M, Khania A, Dyrekvandmoghadam A,Khajavikhan J, Saadipour K. The effect of dexamethasone on nausea , vomiting and pain in parturients underging caesarean delivery. Journal of Clinical And Diagnostic Research 2008; 3:854-8.*

14. *Breen TW, Shapiro T, Glass B, Foster Payne D, Oriol NE, et al. Epidural anesthesia for labor in an ambulatory Patient. Anesth Analg 1993; 77: 919-24*

15. *De Oliveira GS, Almeida MD Jr, Benzon HT, McCarthy RJ. Perioperative single dose systemic dexamethasone for postoperative pain: a meta-analysis of randomized controlled trials. Anesthesiology 2011; 115: 575–88.*

16. *Kang L, Chi-Chang H, Yuan-Yi C., The Effective Dose of Dexamethasone for Antiemesis after Major Gynaecological Surgery, Anesthesia Analogy 1999;89 1316-8*

17. *Szucs S, Jessop D, Iohom G, Shorten GD. Post-operative analgesic effect, of preoperatively administered dexamethasone, after operative fixation of fractured neck of femur: randomized, double blinded controlled study. BMC Anesthesiology 2016; 16: 79.*

18. *M. Heesen K.,Rijs N.,Hilber K., Eid A., Al Oweidi R, Rossaint M. Klimek, Effect of intravenous dexamethasone on postoperative pain after spinal anaesthesia – a systematic review with meta-analysis and trial sequential analysis, Anaesthesia 2019, 74, 1047–1056.*

19. *Kadur SN, Ahmed F, Purohit A, Khandelwal M, Mistry T. The effect of intravenous dexamethasone on postoperative pain, nausea and vomiting after intrathecal pethidine andbupivacaine in lower limb orthopaedic surgery. Anaesthesia, Pain and Intensive Care 2015; 19: 254–9.*

20. *Cardoso MM, Leite AO, Santos EA, Gozzani JL, Mathias LA. Effect of dexamethasone on prevention of postoperative nausea, vomiting and pain after caesarean section: a randomized, placebo-controlled, double-blind trial. European Journal of Anaesthesiology 2013; 30: 102–5.*

21. *Kang L, Chi-Chang H, Yuan-Yi C., The Effective Dose of Dexamethasone for Antiemesis after Major Gynaecological Surgery, Anesthesia Analogy 1999;89 1316-8*

22. *Martin, Jennifer, and P. Vijaya Banu. "A Study on the Performance of Health Care Service Industry in Tamil Nadu." International Journal of Human Resource Management and Research (IJHRMR) 8.6 (2018): 171-176.*

23. *OWONIKOKO, KOLA M., et al. "ASSESSMENT OF BLOOD TRANSFUSION PRACTICES AT CAESAREAN SECTION IN A TEACHING HOSPITAL IN SOUTH-WESTERN NIGERIA." International Journal of Medicine and Pharmaceutical Sciences 4.6 (2014): 69-76.*

24. *Singh, Nishu, and Ashutosh Gaur. "Impact of Training and Development in Indian Health Care." International Journal of Human Resources Management (IJHRM) 3.2 (2014): 13-22.*

25. *CHANDRAMOULI, MANDA, and D. MADHAVI. "COMPARATIVE STUDY OF USG AND CT IN THE EVALUATION OF SUSPICIOUS OVARIAN MASSES." International Journal of General Medicine and Pharmacy (IJGMP) 5.2, Feb - Mar 2016, 39-46*